Listing of Claims:

1. (Currently Amended): A process for regenerating catalyst in a reaction system, wherein the process comprises the steps of:

(a) contacting an oxygenate with a molecular sieve catalyst composition in a reactor under conditions effective to convert the oxygenate to light olefins and to form an at least partially coked molecular sieve catalyst composition;

(b) directing the at least partially coked molecular sieve catalyst composition from the reactor to a catalyst regenerator;

(c) separating air into one or more of its components, using an air separation unit, ~~into~~ to form at least two streams comprising an oxygen stream containing at least about 95 wt% oxygen, at least a portion of which is used as an oxygen-containing regeneration medium, and a nitrogen-containing stream containing at least about 95 wt% nitrogen;

(d) directing the oxygen-containing regeneration medium from the air separation unit to the catalyst regenerator;

(e) contacting the regeneration medium with the at least partially coked molecular sieve catalyst composition in the catalyst regenerator under conditions effective to at least partially regenerate the at least partially coked molecular sieve catalyst composition and form a regenerated catalyst composition; and

(f) directing the regenerated catalyst composition from the catalyst regenerator to the reactor,

wherein at least a portion of at least one of the oxygen stream and the nitrogen-containing stream is directed to a portion of the reaction system other than the regenerator.

2. (Previously Presented): The process of claim 1, wherein the air separating step comprises a cryogenic separation, such that the air separation unit comprises a cryogenic air separation unit, and wherein the regeneration medium has a temperature of from about 16°C to about 149°C at a point immediately before the regeneration medium is introduced into the catalyst regenerator.

3. (Original): The process of claim 2, wherein the regeneration medium has a temperature of from about 27°C to about 93°C at a point immediately before the regeneration medium is introduced into the catalyst regenerator.

4. (Previously Presented): The process of claim 1, wherein the separation of air in the air separation unit further comprises forming a compressed air stream.

5. (Original): The process of claim 2, wherein the regeneration medium further comprises at least a portion of the nitrogen stream.

6.-8. (Cancelled)

9. (Previously Presented): The process of claim 2, wherein step (f) comprises contacting the regenerated molecular sieve catalyst composition with a fluidizing stream under conditions effective to transport the regenerated molecular sieve catalyst composition in a fluidized manner from the catalyst regenerator to the reactor, wherein the fluidizing stream comprises at least a portion of the nitrogen stream.

10. (Original): The process of claim 2, wherein the reactor comprises a reaction zone and a disengaging zone, wherein the process further comprises the steps of:

(a) directing the molecular sieve catalyst composition from the reaction zone to the disengaging zone;

(b) yielding an olefin-containing effluent stream from the disengaging zone;

(c) directing the molecular sieve catalyst composition from the disengaging zone to a standpipe, which is in fluid communication with the reaction zone; and

(d) contacting the molecular sieve catalyst composition with a fluidizing stream in the standpipe under conditions effective to transport the molecular sieve catalyst composition in a fluidized manner from the standpipe to the reaction zone, wherein the fluidizing stream comprises at least a portion of the nitrogen stream.

11. (Original): The process of claim 10, wherein the effluent stream further comprises a polymerization catalyst poison, the process further comprising the steps of:

(a) contacting at least a portion of the effluent stream with a molecular sieve particle under conditions effective to adsorptively remove the polymerization catalyst poison therefrom and to form a poison-containing molecular sieve particle; and

(b) contacting the poison-containing molecular sieve particle with at least a portion of the nitrogen stream under conditions effective to regenerate the poison-containing molecular sieve particle.

12. (Original): The process of claim 10, wherein the effluent stream further comprises an unsaturated compound selected from the group consisting of acetylene, methyl acetylene, butadiene and propadiene, the process further comprising the steps of:

(a) contacting the unsaturated compound with a metal activated catalyst and a hydrogenation medium under conditions effective to hydrogenate the unsaturated compound and to form an at least partially coked metal activated catalyst; and

(b) contacting the at least partially coked metal activated catalyst with a second regeneration medium under conditions effective to convert the at least partially coked metal activated catalyst to a regenerated metal activated catalyst, wherein the second regeneration medium comprises at least a portion of the oxygen stream or at least a portion of the compressed air stream.

13. (Original): The process of claim 2, wherein the reactor comprises a reaction zone and a disengaging zone, and wherein step (b) comprises directing the at least partially coked molecular sieve catalyst from the disengaging zone to the catalyst regenerator.

14. (Original): The process of claim 2, wherein the process further comprises the step of:

(a) operating a valve actuator with a portion of the compressed air stream such that the valve actuator is operable to open or close a valve.

15. (Original): The process of claim 14, wherein the valve controls temperature of a process stream by modulating the flow rate of a heat exchanging medium.

16. (Original): The process of claim 15, wherein the valve is operable to control the temperature of the oxygenate before step (a).

17. (Original): The process of claim 14, wherein the valve is operable to control pressure of a process gas stream.

18. (Original): The process of claim 14, wherein the valve controls the flow rate of one or more process streams.

19. (Original): The process of claim 18, wherein the one or more process streams comprise a heat exchanging medium that heats a reboiler stream.

20. (Original): The process of claim 18, wherein the one or more process streams comprise a heat exchanging medium that cools a condenser stream.

21. (Original): The process of claim 2, wherein the oxygenate comprises methanol, the process further comprising the steps of:

(a) contacting natural gas with at least a portion of the oxygen stream in a syngas generator under conditions effective to convert the natural gas to syngas; and

(b) contacting the syngas with a methanol synthesis catalyst in a methanol synthesis unit under conditions effective to convert at least a portion of the syngas to the methanol.

22. (Original): The process of claim 21, wherein the natural gas comprises H_2S, the process further comprising the steps of:

(a) separating a majority of the H_2S from the natural gas to form a separated H_2S-containing stream;

(b) contacting the separated H_2S-containing stream with a portion of the oxygen stream or with a portion of the compressed air stream under conditions effective to convert a portion of the H_2S in the separated H_2S-containing stream to SO_2; and

(c) contacting the SO_2 with residual H_2S in the presence of a catalyst composition under conditions effective to form elemental sulfur and water.

23. (Original): The process of claim 21, wherein the natural gas comprises water, the process further comprising the steps of:

(a) contacting at least a portion of the natural gas with a molecular sieve particle under conditions effective to adsorptively remove the water therefrom and form a water-containing molecular sieve particle; and

(b) contacting the water-containing molecular sieve particle with at least a portion of the nitrogen stream under conditions effective to regenerate the water-containing molecular sieve particle.

24. (Original): The process of claim 2, wherein the process further comprises the steps of:

(a) contacting at least a portion of the light olefins with a polymerization catalyst under conditions effective to form a polymer; and

(b) contacting the polymer with at least a portion of the nitrogen stream under condition effective to remove volatile compounds from the polymer.

25. (Original): The process of claim 2, wherein the process further comprises the steps of:

(a) contacting at least a portion of the light olefins with a polymerization catalyst under conditions effective to form a polymer; and

(b) blanketing the polymer with at least a portion of the nitrogen stream.

26. (Original): The process of claim 25, wherein the polymer comprises polymer pellets.

27. (Original): The process of claim 2, wherein the process further comprises the step of:

(a) deriming a turboexpander in the reaction system by adding a portion of the nitrogen stream to the turboexpander.

28. (Original): The process of claim 2, wherein the process further comprises the step of:

(a) deriming a cold box in the reaction system by adding a portion of the nitrogen stream to the cold box.

29. (Original): The process of claim 2, wherein the process further comprises the step of:

(a) contacting at least a portion of the molecular sieve catalyst composition with a fluidizing stream under conditions effective to transport at least a portion of the molecular sieve catalyst composition in a fluidized manner from the reaction system to a catalyst storage unit, wherein the fluidizing stream comprises one or more of at least a portion of the oxygen stream, at least a portion of the nitrogen stream or at least a portion of the compressed air stream.

30. (Original): The process of claim 29, wherein the process further comprises the step of:

(a) blanketing at least a portion of the molecular sieve catalyst composition in the catalyst storage unit with a blanketing medium selected from the group consisting of at least a portion of the nitrogen stream, at least a portion of the oxygen stream, at least a portion of the compressed air stream, and combinations thereof.

31. (Original): The process of claim 2, wherein the process further comprises the step of:

(a) directing at least a portion of the oxygen stream or the compressed air stream from the air separation unit to an aerobic water treatment system for removing contaminants from a water-containing effluent stream.

32.-74. (Cancelled).